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Bathynellid Crustaceans from the Islands of Okinawa and Ishigaki-jima in the Ryukyus*

By

Yoshinobu MORIMOTO**

森本義信**：沖縄および石垣島のムカシエビ類

In the present paper, the writer is going to report on the bathynellid crustaceans from Okinawa and Ishigaki-jima of the Ryukyu Islands, obtained by the Natural History Research Project of the Japanese Islands conducted by the National Science Museum, Tokyo. Fifty-five specimens in total were examined and classified into three species. One of them seems to be identical with *Parabathynella gracillima insularis* hitherto known only from the Island of Amami-Oshima, another is a new species allied to *Bathynella yanoi* occurring in the southwestern part of Shikoku, and the other is a member of *Allobathynella* but cannot be conclusively identified because of the immaturity of the specimen examined. They will be described or redescribed, and illustrated.

Before going further, the writer wishes to express his hearty thanks to Dr. Shun-Ichi UENO for his kind aid during the field trip as well as for his supervision of the present study.

List of Localities and the Species Obtained

- No. 1. Interstitial space about 600 m distant from the estuary of the Yona-gawa River at Yona, Kunigami-son, on the northwestern coast of the Island of Okinawa-hontô; W.T. 26.0°C, pH 5.8; 5 August 1972, coll. by S. UENO and Y. MORIMOTO.
Bathynella okinawana sp. n., 1♂.
- No. 2. Interstitial space about 1 km distant from the estuary of the Genka-gawa River at Genka, Nago-shi, on the northwestern coast of the Island of Okinawa-hontô; W.T. 27.8°C, pH 6.0; 5 August 1972, coll. by S. UENO and Y. MORIMOTO.
Parabathynella gracillima insularis MORIMOTO, 3♂♂, 25♀♀, 3 juv.
- No. 3. Dug well (A) at Nago, in the town of Nago-shi, on the northwestern coast of the Island of Okinawa-hontô; W.T. 27.5°C, pH 7.6; 5 August 1972, coll. by S. UENO and Y. MORIMOTO.
Bathynella okinawana sp. n., 1♀.
Parabathynella gracillima insularis MORIMOTO, 1♀.

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** Himeji Municipal High School, Himeji
姫路市立姫路高等学校

- No. 4. Dug well (C) at Nago, in the town of Nago-shi, on the northwestern coast of the Island of Okinawa-hontō; W.T. 23.0°C, pH 7.2; 5 August 1972, coll. by S. UENO and Y. MORIMOTO.

Parabathynella gracillima insularis MORIMOTO, 7♂♂, 12♀♀, 1 juv.

- No. 5. Underground stream in Fukubuku-iizaa Cave at Shiinabaru, at the southern part of the Island of Ishigaki-jima; W.T. 25.0°C, pH 7.4; 30 July 1972, coll. by S. UENO and Y. MORIMOTO.

Allobathynella sp., 1 juv.

***Bathynella okinawana* sp. n.**

(Figs. 1–15)

Relatively small species of medium construction; thorax a little longer than abdomen; cuticle thin and translucent when alive. Head large, a little longer than the first two thoracic somites together. No eyes.

First antennae (Fig. 2) slightly longer than the second, consisting of 7 joints; peduncle as long as the remaining joints together, last joint of peduncle with a minute vestige of endopodite, terminating in 2 setae. Second antennae (Fig. 3) composed of 7 joints; exopodite with 2 setae, one of which is large and widely branches off into two parts. Mandible (Fig. 4) with palp composed of 3 joints terminating in 2 long spines; incisive part with 6 teeth, two of which, uppermost and lowermost, are larger than the middle four. First maxillae with 2 endites. Second maxillae (Fig. 5) with 3 endites; proximal endite ending in 4 setae, second endite ending in 2 plumose setae, third endite with 8 setae, last joint with 4 setae.

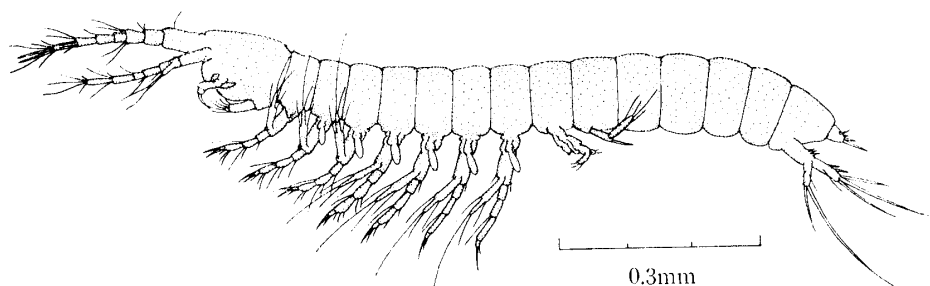
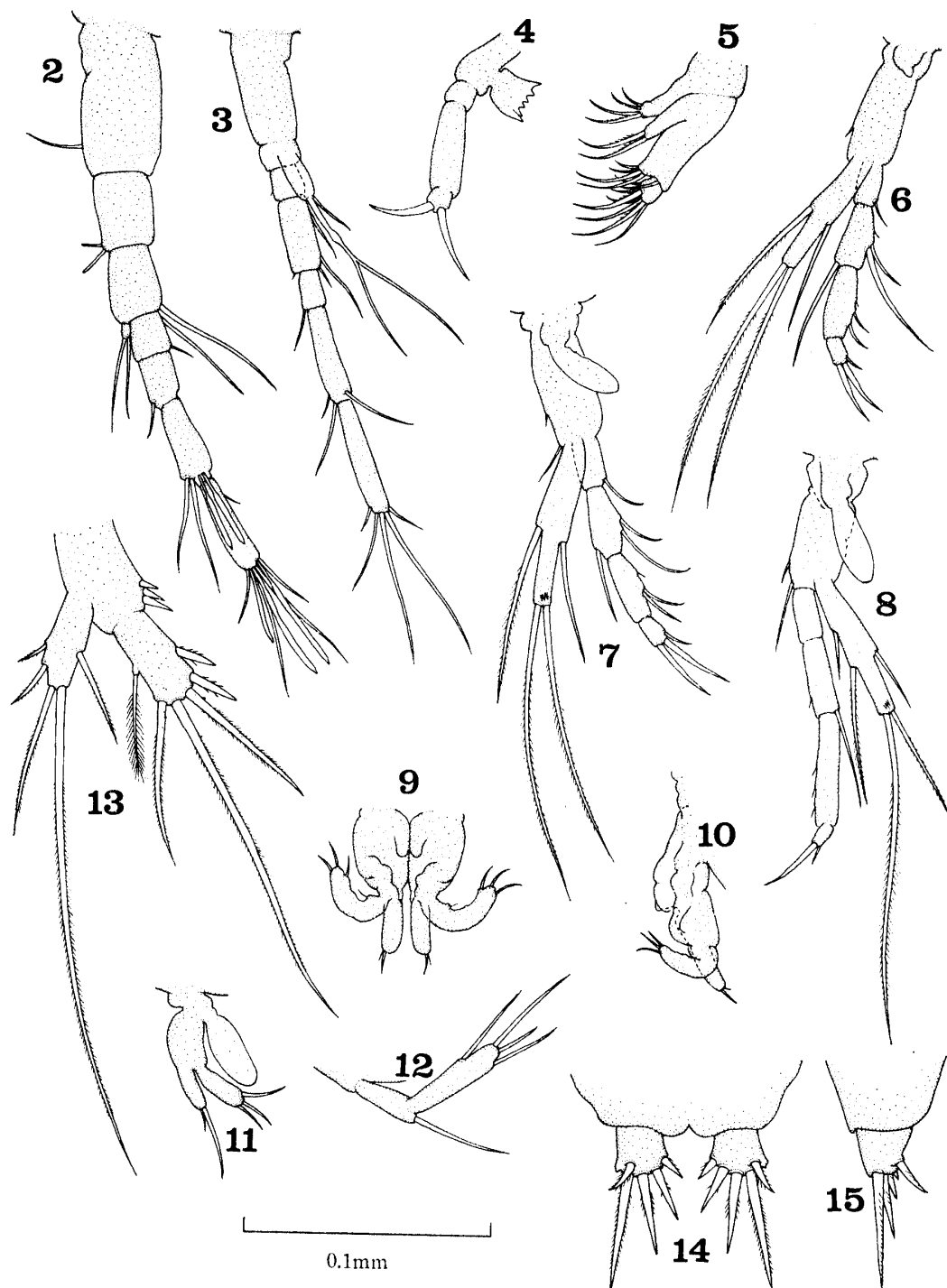


Fig. 1. *Bathynella okinawana* sp. n., ♂, from Yona-gawa (interstitial space) in Is. Okinawa.

Each exopodite of pereopods uni-jointed, in pairs 1–7 with 2 long plumose setae at apex and 2 setae on either side of the median part; each endopodite of pairs 1–7 composed of 4 joints, last joint in pairs 1–5 with 2 apical spines and 1 seta, that in pairs 6–7 with 1 apical spine and 1 seta; coxopodite 2–7 each bearing an epipodite. Pereiopods 8 in ♂ (Figs. 9, 10): both exopodite and endopodite uni-jointed, the former about twice as long as the latter; endopodite with 2 apical setae; exopodite with 3 apical setae, a small seta being present on its outer margin near the base; no epipodite. Pereiopods 8 in ♀ (Fig. 11) with a large epipodite; exopodite with 3 apical setae; endopodite with 2 setae of different length at apex. Pleopods (Fig. 12): joint 1 with a single seta, joint 2 with 4 setae



Figs. 2-15. *Bathynella okinawana* sp. n. — 2. First antenna. — 3. Second antenna. — 4. Mandible. — 5. Second maxilla. — 6. Pereiopod 1. — 7. Pereiopod 3. — 8. Pereiopod 7. — 9. Male pereiopod 8, ventral view. — 10. Male pereiopod 8, lateral view. — 11. Female pereiopod 8. — 12. Pleopod. — 13. Uropod. — 14. Telson, dorsal view. — 15. Telson, lateral view.

of different length, two of which are present at apex and the other two on the outer distal and inner margins.

Uropods (Fig. 13) biramous; peduncle broad, inner-distally with a row of 3 spines whose lengths increase successively towards the apical end; endopodite broad, somewhat dilated distally, with 3 long plumose setae at apex, 2 spine-like setae on the distal inner margin, and 1 plumose seta on the outer margin; exopodite with 2 long plumose setae at apex, 1 plumose seta on the inner margin and 2 plumose setae on the outer margin; one of the apical setae about 3 times as long as the other. Telson (Figs. 14, 15): each lobe obtusely tuberculate at the outer distal corner, having 4 plumose spines on the distal margin, which increase in length externally, and 1 dorsal plumose spine near the apical outer margin.

Length of body: 0.85 mm in ♂ (holotype), 0.95 mm in ♀ (allotype).

Type-series. Holotype: ♂ (interstitial space of Yona-gawa River, 5 August 1972, coll. by S. UÉNO and Y. MORIMOTO). Allotype: ♀ (dug well (A) at Nago, 5 August 1972, coll. by S. UÉNO and Y. MORIMOTO).

Both the holotype and the allotype are deposited in the collection of the National Science Museum, Tokyo.

Localities. Yona-gawa River (interstitial space) at Yona, Kunigami-son, on the north-western coast of the Island of Okinawa-hontô (type-locality); and dug well (A) in the town of Nago-shi on the northwestern coast of the Island of Okinawa-hontô.

Notes. This new species seems to belong to the group of *Bathynella morimotoi* UÉNO (1952, p. 318) and is related to *B. yanoi* MORIMOTO (1959 b, p. 281) from the southwestern coast of the Island of Shikoku. It is, however, distinguished from the latter by 1) incisive part of mandible with 6 teeth, 2) joint 2 of pleopod with 4 setae, 3) uropods rather slender, and, 4) telson with a small tubercle at the outer distal corner.

***Parabathynella gracillima insularis* Y. MORIMOTO**

(Figs. 16–32)

Parabathynella gracillima insularis Y. MORIMOTO, 1959, Mem. Coll. Sci. Univ. Kyoto, (B), 26, p. 277, figs. 26–37.

This subspecies was originally described on a pair of the specimens obtained from

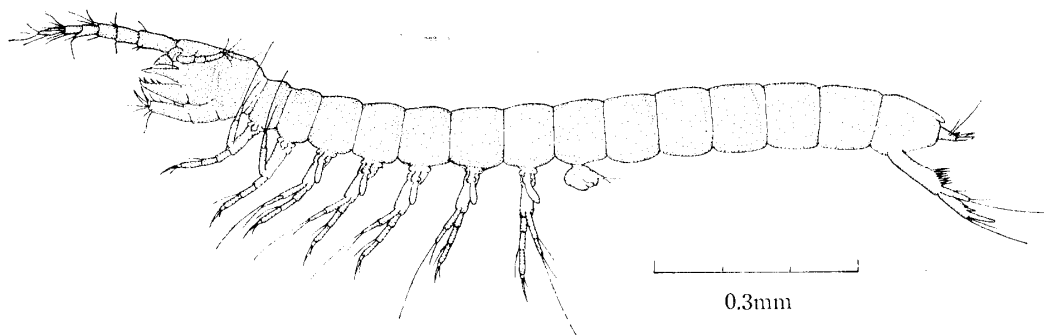
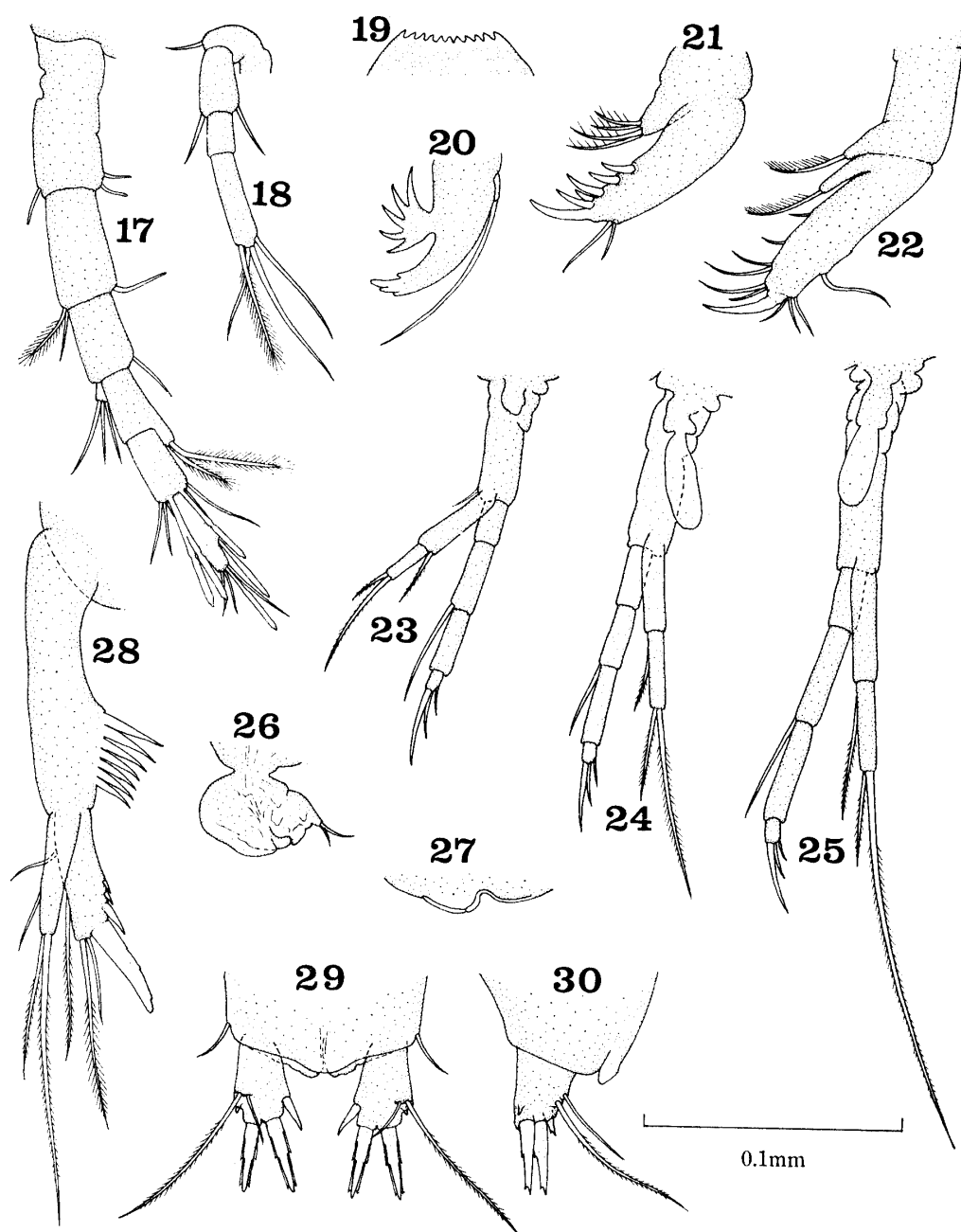


Fig. 16. *Parabathynella gracillima insularis* Y. MORIMOTO, ♂, from Genka-gawa (interstitial space) in Is. Okinawa.

two driven wells in Nazé of the Island of Amami-Oshima. As a fuller series of specimens was taken in the Island of Okinawa-hontô, the writer prefers to give below a renewed description based on these materials.

Body slender, thorax a little longer than abdomen, the first thoracic somite the shortest; color white when alive. Head longer than wide, and nearly as long as the first three thor-



Figs. 17-30. *Parabathynella gracillima insularis* Y. MORIMOTO. —17. First antenna. —18. Second antenna. —19. Labrum. —20. Mandible. —21. First maxilla. —22. Second maxilla. —23. Pereiopod 1. —24. Pereiopod 3. —25. Pereiopod 7. —26. Male pereiopod 8. —27. Female pereiopod 8. —28. Uropod. —29. Telson, dorsal view. —30. Telson, lateral view.

acic somites together, with the anterior margin rounded.

First antennae (Fig. 17) of 6 joints, peduncle about 1.5 times as long as the remaining joints together, last joint of peduncle with a single vestigial endopodite bearing 3 setae. Second antennae (Fig. 18) of 4 joints, recurved and reaching back basal one-third of head; basal joint strongly curved outwards and backwards, third joint very short, last joint the longest, terminating in 4 setae. Labrum (Fig. 19) provided with 11 small teeth on the front margin. Mandible (Fig. 20) rather slender, terminating in 4 blunt teeth; molar plate armed with 5 setae; mandibular palp single, with a long apical seta. First maxillae (Fig. 21) with two endites; the proximal endite with 4 plumose setae at apex, distal endite armed with 6 incurved spines on the inner margin in apical half and 2 setae of different length on the apical outer margin. Second maxillae (Fig. 22) with 3 endites; both proximal and second endites ending in a single plumose seta; third endite with 10 setae; last joint with a single spine at apex.

Pereiopods with 4-jointed endopodites, the last joint bearing 2 apical spines and 1 seta; exopodites 2-jointed, first joint with 1 plumose seta, second joint with 2 long plumose setae of different length at apex; one epipodite on the outer side of coxopodites, well developed in pairs 3–7. Pereiopods 8 in ♂ (Fig. 26) rounded, with endopodite very small and tipped with 2 short setae. Pereiopods 8 in ♀ (Fig. 27) represented by only a small rudimentary process about 20 μ long and 15 μ wide. No pleopod.

Uropods (Fig. 28) large and stout; peduncle long, armed with a row of 7–8 spines on the distal inner margin; endopodite broad and a little longer than exopodite, somewhat widening at the distal end and provided with 4 spines and 4 setae; the spines are ranged on the apical inner margin and increase in length apically, the last (fourth) spine being remarkably long and stout, much larger than the other three; the setae are inserted on the outer margin, two of them being at apex; exopodite slender, with 2 long plumose setae of different length at apex and 1 seta on the outer margin. Telson (Figs. 29, 30): each lobe with 4 spines on the distal margin; the outermost very small, median two longer and stouter than the innermost; 2 setae of different length present on the outer dorsal margin.

Length of body: 0.7–1.2 mm in ♂♂, 0.8–1.3 mm in ♀♀, 0.6–0.7 mm in juv.

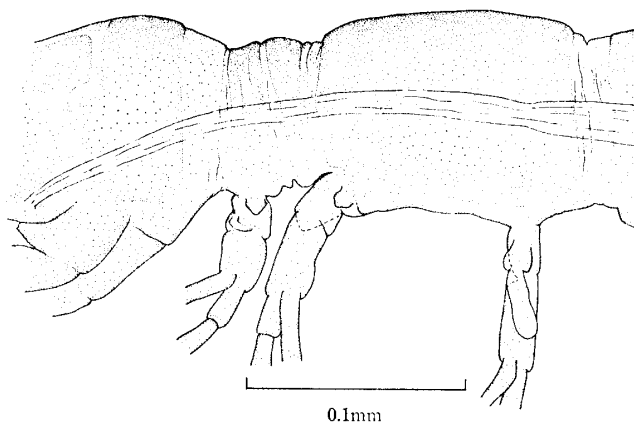


Fig. 31. Aberrant prothorax in an individual of *Parabathynella gracillima insularis* Y. MORIMOTO, from Nago in Is, Okinawa.

Specimens examined. 3♂♂, 25♀♀, 3 juv. (Genka-gawa River, 5 August 1972, coll. by S. UÉNO and Y. MORIMOTO); 7♂♂, 13♀♀, 1 juv. (Dug wells (A) and (C) at Nago, 5 August 1972, coll. by S. UÉNO and Y. MORIMOTO).

All the specimens examined are deposited in the collection of the National Science Museum, Tokyo.

Notes. A female specimen taken from a dug well (A) in the town of Nago is an aberrant individual, having the third and fourth thoracic somites fused together and lacking in the second pereopods (cf. Fig. 31). It is, however, similar to normal individuals in all the other respects.

***Allobathynella* sp.**

(Figs. 32–41)

A single immature bathynellid was taken from the sandy bed of an underground stream in Fukubuku-iizaa Cave at the southern part of the Island of Ishigaki-jima. It is 0.9 mm in length and has 5 pairs of pereopods. It seems to belong to the genus *Allobathynella*.

First antennae of 6 joints; second antennae of 5 joints. First maxillae: distal endite with 5 incurved spines. Pereiopods: exopodite of pairs 1–5 2-jointed; epipodite present in pairs 3–5. Uropods: peduncle with a row of 4 spines; endopodite with 1 large spine at apex, but the apical inner spine is not well developed. Telson armed with 3 inner spines and 2 apical spines.

Specimen examined. 1 juv. (Fukubuku-iizaa Cave in Is. Ishigaki-jima, 30 July 1972, coll. by S. UÉNO and Y. MORIMOTO).

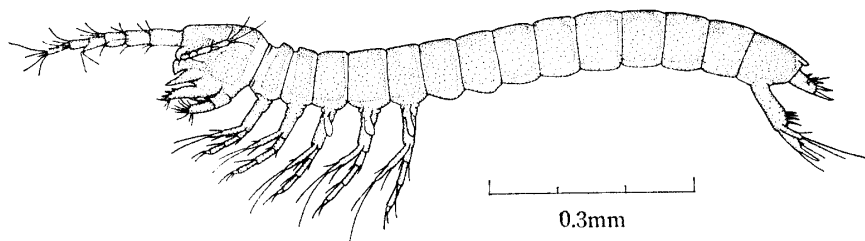
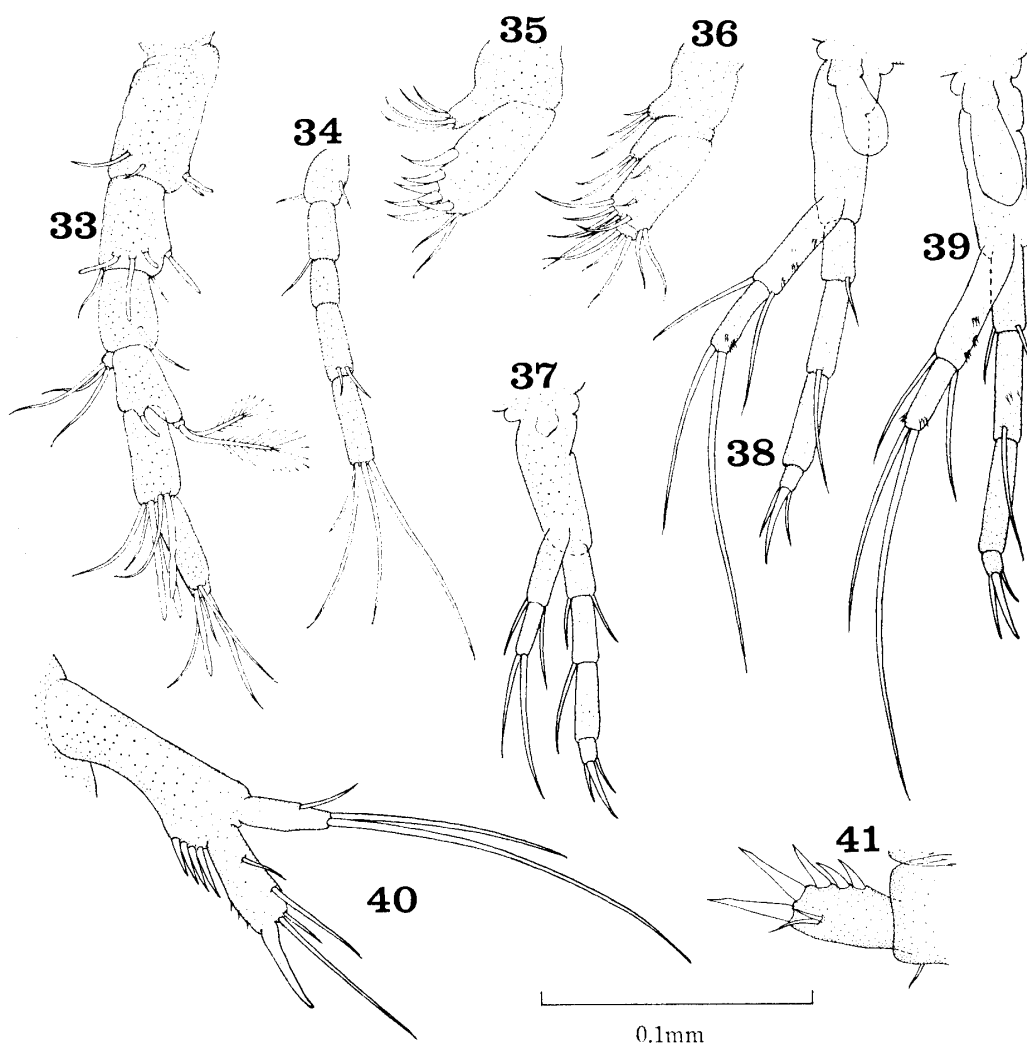


Fig. 32. *Allobathynella* sp., from Fukubuku-iizaa Cave in Is. Ishigaki-jima.

Brief Discussion

Only three species of bathynellid crustaceans have hitherto been reported from the Ryukyu Islands. They are: *Bathynella oshimensis* UÉNO et MORIMOTO (1956, pp. 53–55, figs. 1–10), *Allobathynella gigantea* (MORIMOTO) (1959 a, pp. 270–277, figs. 1–25) and *Parabathynella gracillima insularis* MORIMOTO (1959 a, pp. 277–279, figs. 26–37). The first two species have been known from the subterranean waters of the Islands of Amami-Oshima and Toku-no-shima, while the last-named was previously recorded only from the Island of Amami-Oshima. According to the present study, our knowledge of the bathynellid fauna of the Ryukyus becomes much fuller. At least five different species are now



Figs. 33–41. *Allobathynella* sp. — 33. First antenna. — 34. Second antenna. — 35. First maxilla. — 36. Second maxilla. — 37. Pereiopod 1. — 38. Pereiopod 3. — 39. Pereiopod 5. — 40. Uropod. — 41. Telson, dorsal view.

known from four main islands of the central and southern Ryukyus.

The two species of the genus *Bathynella* have their closest relatives in the mainland of Japan, that is, *B. oshimensis* is related to *B. intermedia* UÉNO from central Honshu and *B. okinawana* to *B. yanoi* MORIMOTO from southwestern Shikoku. *Allobathynella gigantea* occurs also in Kyushu, though the Kyushu population of this large species is subspecifically different from that of the Ryukyus. *Parabathynella gracillima* is distributed over the central Ryukyus, the mainland of Japan except for Hokkaido, and South Korea, and becomes differentiated into several subspecies. To sum up, all the bathynellid crustaceans that occur in the central Ryukyus have their relatives in the mainland of Japan.

It is difficult to ascertain the true affinity of the bathynellid inhabiting the Island of Ishigaki-jima, since the single specimen known is not fully mature. However, it does not accord with any of the species hitherto described from the central Ryukyus or from the mainland, and may have a remote relationship with *A. malaya* (G. O. Sars) (cf. UÉNO, 1969).

from the Malay Peninsula. Unfortunately, nothing has been known on the bathynellid faunas of Taiwan and South China, so that it may be difficult to establish the true relationship of the Ishigaki species even if sufficient material of the latter is found in near future. We can, however, safely conclude that there is a gap in the bathynellid fauna between the central and the southern Ryukyus.

Incidentally, no bathynellid has been obtained in such recent islands as Miyako-jima, Okinoérabu-jima and Yoron-tô. This is interesting, because bathynellids are said to be of marine origin and appear to have had no difficulty to settle down in such calcareous islands.

要 約

今回の調査で、沖縄本島と石垣島からはじめてムカシエビ類が見つかった。沖縄本島産のオナガムカシエビ属の1種は、奄美大島のアマミオナガムカシエビ *Parabathynella gracillima insularis* と同一であり、石垣島のカワリムカシエビ属 *Allobathynella* の1種は、幼体であったので種の決定ができなかった。沖縄本島産のムカシエビ属の1種には、オキナワムカシエビ *Bathynella okinawana* という新名を与えてこの論文に記載した。今回の分をあわせて、琉球全体のムカシエビ類を総括すると、ほぼ次のようになる。

オオシママカシエビ *Bathynella oshimensis* とアマミカワリムカシエビ *Allobathynella gigantea* とは、どちらも奄美大島と徳之島とに分布し、アマミオナガムカシエビは、前述のとおり奄美大島と沖縄本島から同じ種がとれている。また、オキナワムカシエビは、四国南西部のヤノムカシエビ *Bathynella yanoi* に近い種であって、いずれの場合にも中部琉球と日本のものとの関連性がみられる。しかし、石垣島産のカワリムカシエビ属の1種は、中部琉球や日本のものと似ていないので、中部琉球と石垣島とのあいだで、ムカシエビ類の分布に断絶があるのではないかと思われる。

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